Analysis of Concrete Pavement Responses from the FAA Instrumented Runway at Denver International Airport

Dulce Rufino

ABSTRACT

Concrete pavement responses have been collected from the runway 34R-16L at Denver International Airport, since it was opened to traffic in 1995. Several sensors have been installed in sixteen slabs to collect data of interest for pavement analysis such as temperature profile, joint opening, location of the aircraft, strain and displacement. In addition to sensors embedded into the pavement, Heavy Weight Deflectometer (HWD) tests are performed on a quarterly basis. The collected data are processed and stored in an ORACLE7 database accessible through the World Wide Web at http://www.airtech.tc.faa.gov/DENVER/. The FAA Center of Excellence for Airport Technology is under a major effort to analyze the data collected from DIA instrumented runway. Visual basic programming has been used to automate the process of crossing information between the different groups of the database that contain a massive amount of data. Some of the existing data have been extensively analyzed such as joint opening, temperature profile through the slab depth, Load Transfer Efficiency (LTE) and estimation of pavement properties based on HWD tests, data from position sensors, and data related to slab-base interface condition, such as slab lift off and strain from coupled strain gages. A good estimation of all those parameters is crucial in the analysis of pavement strains and displacements. Airfield concrete pavements have been traditionally designed against fatigue due to repeated aircraft loading ignoring the environmental effects. This project will allow for evaluating the importance of considering environmental factors such as temperature curling on the concrete slab structural responses (strain, stress and displacement). In order to design concrete pavements for the intended service life, accurate estimation of stresses in the slab are paramount along with the appropriate transfer functions. The measured *in-situ* response data at DIA will assist in making sound engineering judgments on if and how temperature curling should be considered in concrete pavement design for airfields.